
Rule CIC168: LSR buffer sizes may be inappropriate

Finding: CPExpert has detected that the data buffer size or index buffer size of VSAM files assigned to a Local Shared Resources (LSR) pool do not match the size of the LSR buffers.

Impact: This finding should normally have a LOW IMPACT or MEDIUM IMPACT on the performance of the CICS region.

Logic flow: This is a basic finding, based upon an analysis of the daily CICS statistics.

Discussion: VSAM files can be assigned as nonshared resources (NSR) files or assigned to a local shared resources (LSR) pool. The major difference between the two methods is how the VSAM strings and VSAM buffers are allocated and used. Please refer to Rule CIC167 for further explanation of this difference.

When CICS VSAM files are assigned to LSR pools, the files share common strings and buffers assigned to the LSR pool. There is no "preallocation" of strings or buffers to particular files. Since the strings and buffers are shared, significantly fewer strings and buffers normally are required to support I/O access operations. This is because not all files will be accessed at any particular time.

Buffers are assigned to LSR pools using the BUFFERS operand of the DFHFCT TYPE=SHRCTL macro. Alternatively, the number of buffers assigned to the LSR pool can be automatically computed by CICS using an algorithm based on the number of strings associated with files assigned to the pool. This number is normally much less than the sum of the strings associated with files assigned to the LSR pool (The default computed value is 50% of the number of strings assigned to files, with adjustments to ensure that the minimum required buffers are assigned.).

Buffers are normally specified with different sizes, with the different sizes corresponding to the size of the control interval (CI) for data and index records of files assigned to the LSR pool. The buffer size specification can be made using the BUFFERS operand (as described above).

Alternatively, the buffer size can be automatically computed by CICS, when CICS is computing the number of buffers in the LSR pool. CICS computes the buffer size based upon the requirements of the data and index record sizes of the files assigned to the LSR pool.

If CICS computes the buffer sizes, the LSR pool will have buffers assigned to match the size of the files assigned to the LSR pool. However, if the buffer sizes are defined using the BUFFERS operand, the user has the responsibility of assigning the number of buffers and the buffer sizes. In this case, the buffer sizes may not match the size of the data or index records of the files assigned to the LSR pool.

If there are no buffers with a size matching the data or index CI sizes of a file, VSAM will select the next largest buffer size that is assigned to the LSR pool. For example, suppose that the LSR pool were assigned buffers of 2048 bytes and 4096 bytes. If a data or index CI size for a file were 1024 bytes, VSAM would select the next largest size buffer (in this example, VSAM would select buffers from the 2048 byte pool).

This "mismatch" of CI sizes to buffer pool sizes has two effects:

- Buffer space is wasted, since a data or index record of 1024 will require a buffer of 2048. This results in an inefficient use of storage.
- An unnecessarily large number of buffers may be specified for the larger buffer pool, to prevent files waiting on buffers.

CPEXpert analyzes the size of the data and index CIs for files assigned to each LSR buffer pool. CPEXpert produces Rule CIC168 if there are any data or index CIs without corresponding buffer sizes assigned to the LSR pool.

Suggestion: CPEXpert suggests that you assign VSAM buffers to the LSR pool with sizes corresponding to the size of the data or index CIs of the files assigned to the LSR pool.

An initial reaction to this type of problem might be to "Let CICS compute the buffer size." However, there are many situations in which CICS will not compute an appropriate number of buffers or strings for a LSR pool. (Other rules in the CIC16x series give examples of inappropriate computation of the number of buffers or buffer strings.)

So long as storage is **not** a constraint for the CICS region, CICS can satisfactorily compute the number of buffers and strings. CICS can be directed to increase the number of buffers and strings by increasing the value of the RSCLMT operand in the SIT. If storage is not a constraint, this may be an acceptable approach, since CICS will adjust the number of buffers and strings based upon the value of the RSCLMT operand.

However, if storage **is** a constraint, allowing CICS to compute the number of buffers may result in an inappropriate number of buffers and strings.

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- CICS computes the required number of buffers of each size based upon the STRNO operand in the DFHFCT entry, the number of levels in the index for index components, etc. After the total number of buffers of each required size is computed, the number of buffers in each size is reduced to either 50% of the computed value or to the percentage specified in the RSCLMT operand (a minimum of 3 buffers and a maximum of 255 strings are imposed on the result).

For example, if the RSCLMT operand specified 65%, the number of buffers and strings would be reduced to 65% of the computed total for each size. If the RSCLMT operand specified 35%, the number of buffers and strings would be reduced to 35% of the computed total for each size.

- The RSCLMT operand applies to all buffer sizes and to all LSR pools. Consequently, it is not possible to adjust the number of buffers based upon the requirements of the files assigned to individual LSR pools or based upon the buffer sizes generated for each LSR pool.
- A significant amount of storage may be wasted if CICS is allowed to compute the buffer and string values associated with LSR pools. This is especially true if the RSCLMT operand is increased to a value necessary to improve the buffer "look-aside" read hit ratio for specific buffer sizes or to eliminate the wait-on-buffer condition of specific files.

If storage is a constraint, CPExpert suggests that you use the BUFFERS operand to explicitly define the buffer sizes and number of buffers in LSR pools for the CICS region. The buffer sizes should match the data and index CI sizes of the files assigned to the LSR pool.

There can be an unusual situation in which you may wish to not match all buffer sizes with the data and index CI sizes of the files assigned to the LSR pool. Suppose you have a file with data or index CI sizes that do not match the sizes of the other files, and further suppose that the file has a very low activity rate. If you specify buffers of this size for the LSR pool, the virtual storage will be reserved for the buffers even though the file rarely uses the buffers. When the file is not using the buffers, the virtual storage is wasted. Of course, this does not matter if virtual storage is not a constraint. However, if virtual storage is a constraint, you may wish to deliberately not assign buffers of the size necessary to accommodate the file, and allow the file to default to the next larger buffer size on the rare times when it is accessed.

Reference: *CICS/OS/VS Version 1.7 Performance Guide*: pages 65-68, pages 232-238, and page 244.

CICS/MVS Version 2.1.2 Performance Guide: pages 158-162, page 170, and pages 394-397.

CICS/ESA Version 3.1.1 Performance Guide: pages 71-73, pages 93-106, and page 239.

CICS/ESA Version 3.2.1 Performance Guide: pages 147-152, page 155, and pages 310-321.

CICS/ESA Version 3.3.1 Performance Guide: pages 157-162, pages 165-166, and pages 329-339.

CICS/ESA Version 4.1.1 Performance Guide: Section 4.4.2, Section 4.4.4, and Appendix A.1.11.

CICS/TS Release 1.1 Performance Guide: Section 4.4.2, Section 4.4.4, and Appendix 1.1.9.

CICS/TS Release 1.2 Performance Guide: Section 4.4.2, Section 4.4.4, and Appendix 1.1.10.

CICS/TS Release 1.3 Performance Guide: Section 4.6.2, Section 4.6.4, and Appendix 1.1.11.

CICS/TS for z/OS Release 2.1 Performance Guide: Chapter 18 (VSAM resource usage (LSRPOOL)), Chapter 18 (VSAM buffer allocations for LSR), and Appendix A (Table 53).

CICS/TS for z/OS Release 2.2 Performance Guide: Section 4.5.2 Defining VSAM resource usage, Section 4.5.4 Defining VSAM buffer allocations for LSR, and Appendix 1.1.17.6. |